Ecosystem Work Group Progress Report

Report by the Ecosystem Work Group

Delta Vision Blue Ribbon Task Force
25 April 2008

Ecosystem Work Group Staffing and Member and Resource Organizations

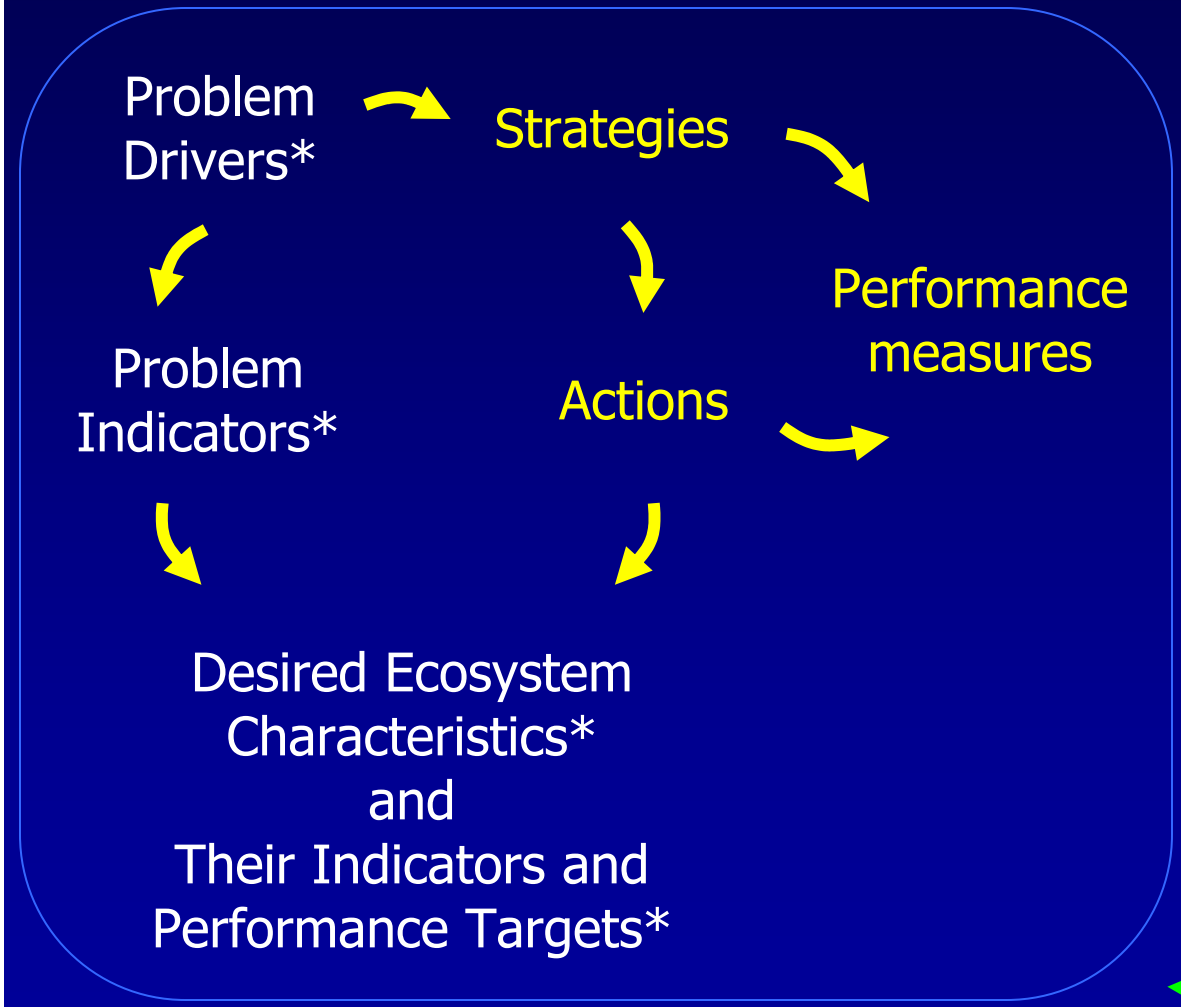
Staffing

- Stuart Siegel, technical coordinator, Wetlands and Water Resources, Inc.
- Terry Macaulay, Delta Vision staff coordinator, CALFED
- Greg Bourne, facilitator, Center for Collaborative Policy

Member and Resource Organizations

- The Bay Institute
- Ducks Unlimited
- CALFED Science Program
- U.S. Environmental Protection Agency
- California Department of Fish and Game
- U.S. Geological Survey
- Suisun Resource Conservation District
- Santa Clara Valley Water District
- Contra Costa Water District
- U.S. Fish and Wildlife Service
- NOAA National Marine Fisheries Service

Status, Elements of Recommendations



- *Restoration recipe*
- *Principles*
- *Conceptual models*
- *15 Vision elements*
- *Ongoing change (e.g., sea level rise)*

Adaptive Management

** Nearly complete*

Problem Statement: *Indicators*

1. Population declines of native resident and migratory fish species
2. Impaired primary and secondary production
3. Low variability in the aquatic environment
4. Minimal and uniform habitat with poor connectivity
5. Poor transit corridor for migratory fish
6. Poor water quality (environmental, contaminants)

Problem Statement: *Drivers*

1. Physical habitat loss
2. Flow-related habitat loss
3. Loss of connectivity and lengthy interfaces between ecosystem types
4. Harmful aquatic invasive species
5. Altered flow regimes
6. Altered geometry of Delta waterways
7. Low variability in surface water residence times
8. Entrainment
9. Contaminant loading

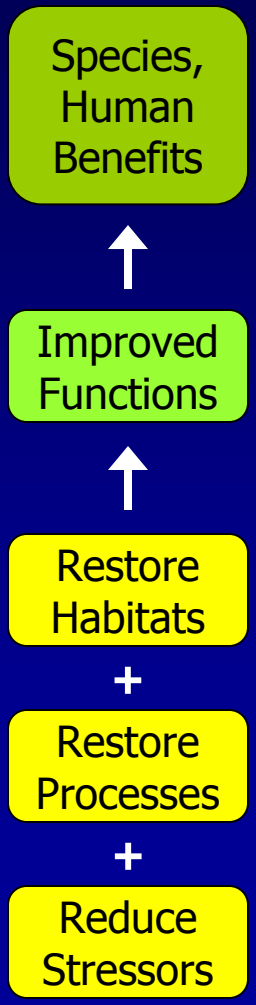
Hierarchy for Following Slides

Desired Ecosystem Characteristic

- ➔ Indicator: ≥ 1 per characteristic
  - ➔ Performance target: ≥ 1 per indicator

Desired Ecosystem Characteristics

One or more quantitative performance targets per characteristic set at levels to achieve Delta Vision ecosystem goals to the extent the system can support their achievement



Group 1: Species and Human Society Benefits

1. Viable populations of native resident fishes and migratory birds
2. Functional corridors for migratory fish species
3. Ecosystem functions that support humans

Group 2: Habitats, Processes, Stressors

4. Diverse mosaic of habitats and ecosystem processes to support native resident and migratory estuarine species
5. Stressors reduced to below levels of adverse effects

Characteristic
Indicator
Target

Indicators for Group 1: Species and Human Outcomes

1. Viable populations of native resident fishes and migratory birds
   a) Abundance of selected species representing diverse functional groups
   b) Geographic distribution
2. Functional corridors for migratory fish species
   a) Migration success
   b) Connectivity to upstream and downstream habitats
   c) Suitable environmental water quality and flow along migratory corridors
3. Ecosystem functions that support humans
   a) Flood protection
   b) Water quality
   c) Recreation
   d) Buffers

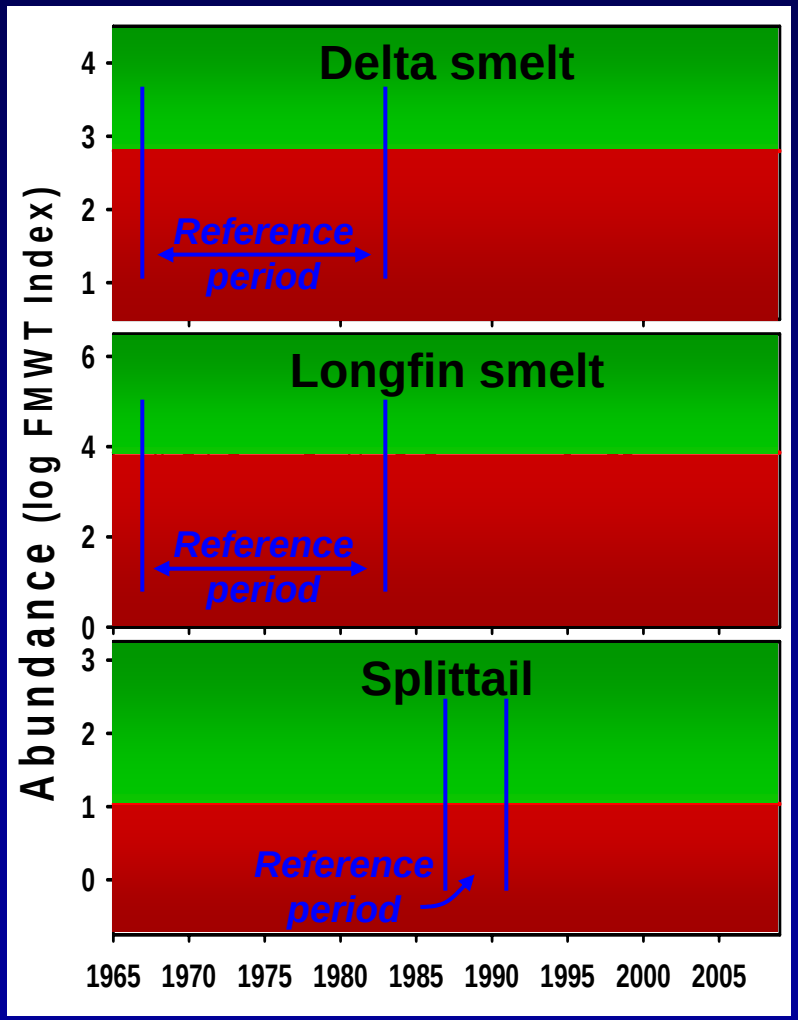
Characteristic
Indicator
Target

Characteristics and Their Indicators Group 2: Habitats, Processes, Stressor Reductions

1. Diverse mosaic of habitats and ecosystem processes to support native resident and migratory estuarine species
   a) Areal extent of tidal marsh, floodplains, uplands, open water
   b) Ecosystem characteristics of (i) complexes of habitats, (ii) spatially distributed complexes, (iii) connectivity within and between complexes, (iv) productivity, and (v) durability/resiliency
2. Stressors reduced to below levels of adverse effects
   a) Reduced contaminant impacts
   b) Reduced or eliminated entrainment
   c) Reduced impact of current and possible future nuisance invasive species

Characteristic
Indicator
Target

Example 1: Viable Populations of Native Resident Fishes



1. Abundance

Delta smelt: ≥100% average 1967-1983 FMWT

Longfin smelt: ≥100% average 1967-1983 FMWT

Splittail: ≥100% average of 1987-1991 FMWT

2. Geographic Distribution

Delta smelt: present in all FMWT sites that occur within target fall habitat

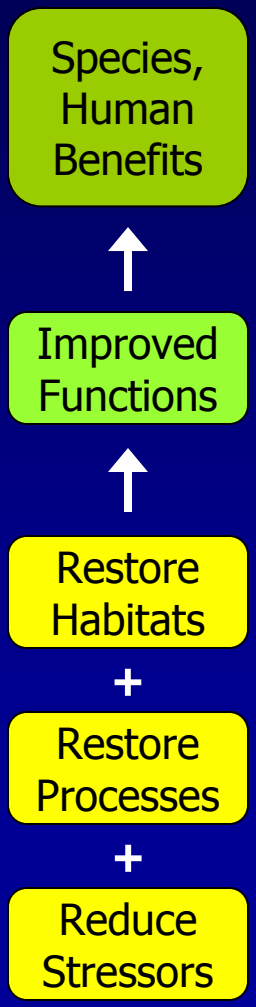
Splittail: spawning adults present in all accessible seasonal floodplain habitats

Characteristic Indicator

Target

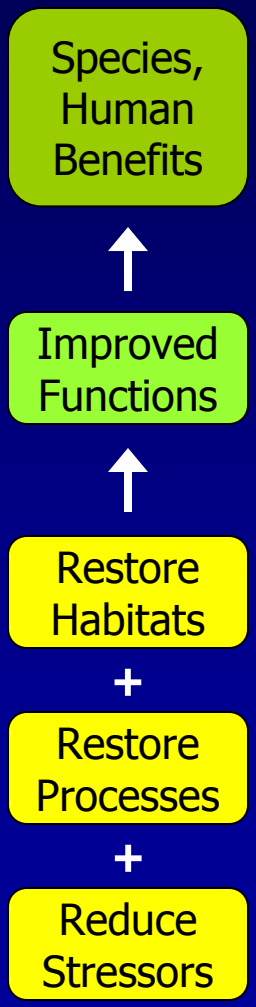
Strategies for Delta Smelt

Examples do not reflect full range needed to achieve targets



1. Restore tidal marsh and floodplain habitats connected to open water in order to improve food web support
2. Establish 35,000 acres of fall (Sep-Nov) open water habitat with salinities below 10 mS/cm
3. Reduce entrainment at diversions
4. Control harmful invasive species to reduce predation and competition

Example 2: Viable Populations of Migratory Birds



Characteristic Indicator ***Target***

Abundance

Ducks: ≥1.4 million at peak wintering

Shorebirds: ≥70,000 at peak wintering

Aleutian Goose: Sustain 50% of world's population during winter residence

Tundra swan and white-fronted goose: Sustain 40% of Pacific flyway population during winter residence

Canvasback: Sustain 40% of Pacific flyway population during winter residence

Strategies

Improve 1° and 2° production, provide roosting and foraging habitats: Restore and enhance tidal marsh, seasonal wetlands, floodplain inundation, and shallow open water in Suisun and Delta

Reduce contaminant exposure

Example 3: Habitats and Processes – *Extent*

Progress to targets over time

a) *Long-term (>30 yr):* all suitable areas
b) *Short-term (<30 yr):* half of suitable areas
c) *10 and 20 yr targets:* ½ and ¾ of short-term targets, respectively, plus seek land rights in later-phase properties

1. Tidal wetlands

a) *Suitable area:* about 80K ac Delta (being refined), 50K ac Suisun
b) *Early priority areas:* Cache Slough, Suisun, Dutch Slough, Prospect?, McCormick?

2. Seasonal floodplains

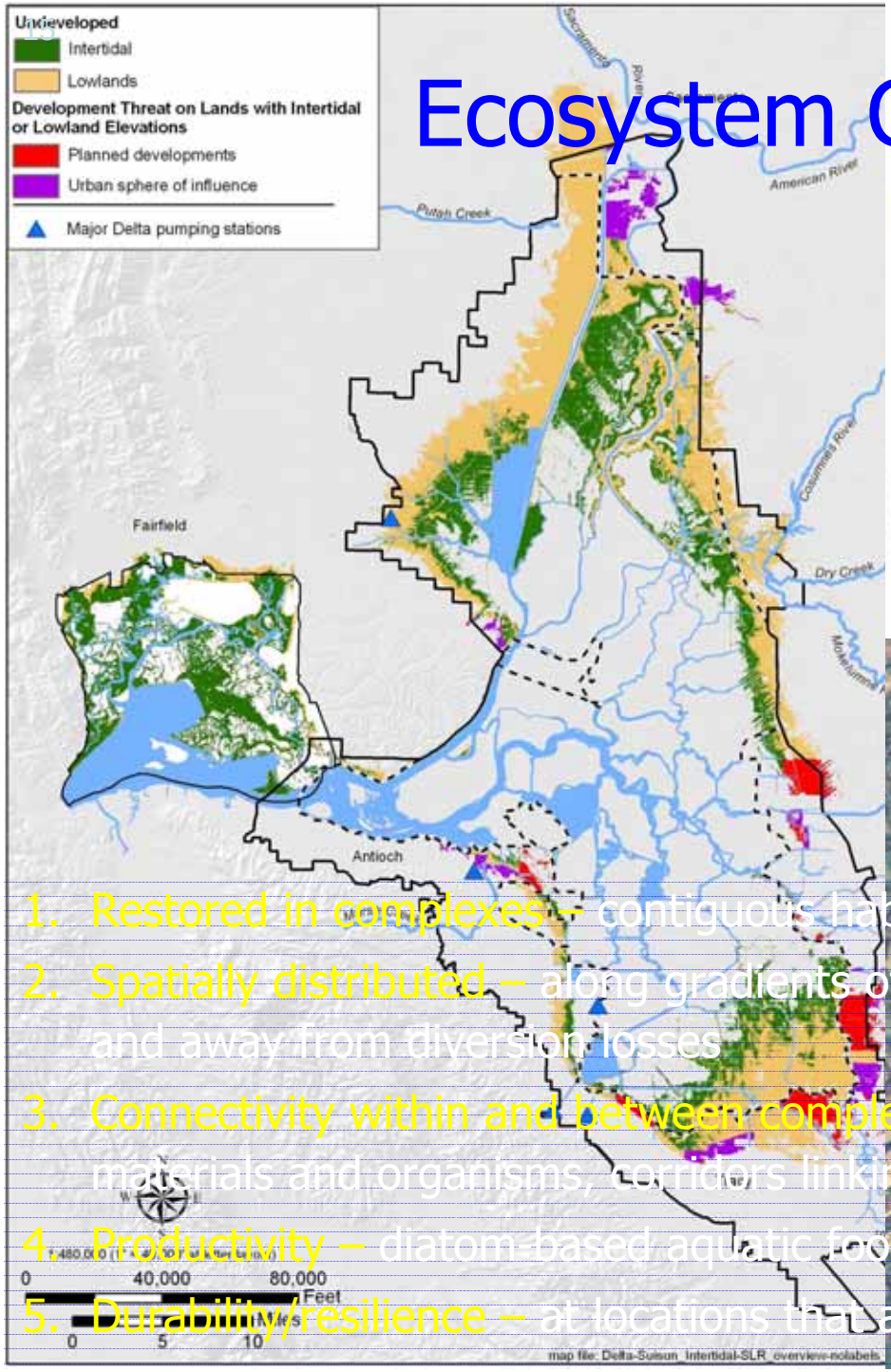
a) *Suitable area:* >50K ac (needs to be refined) with variable inundation, annual vegetation (e.g., Ag) and riparian forest
b) *Early priority areas:* Yolo, Cosumnes-Mokelumne, San Joaquin, McCormick?

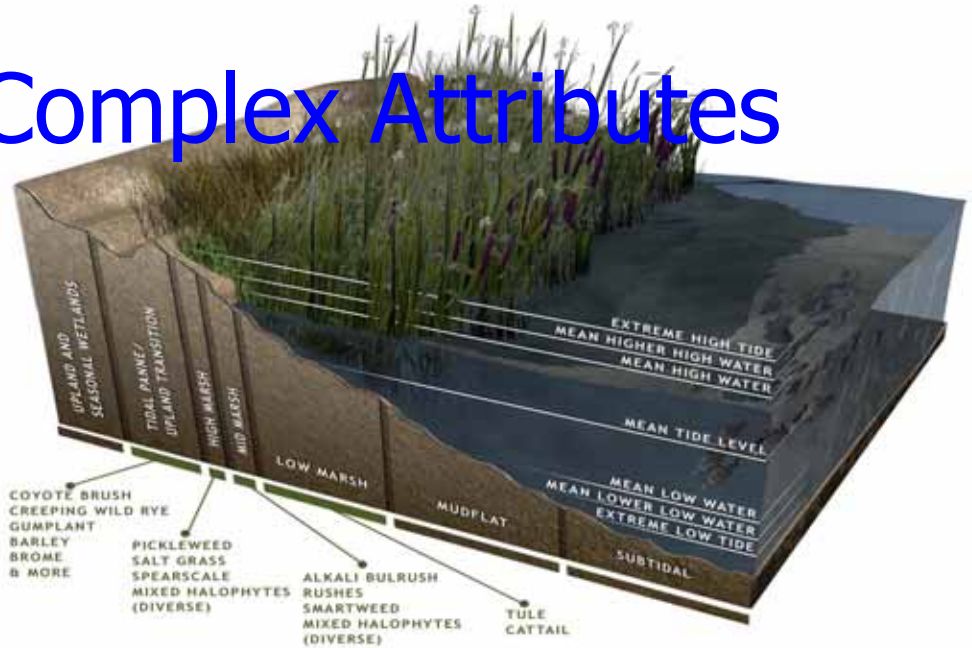
continued

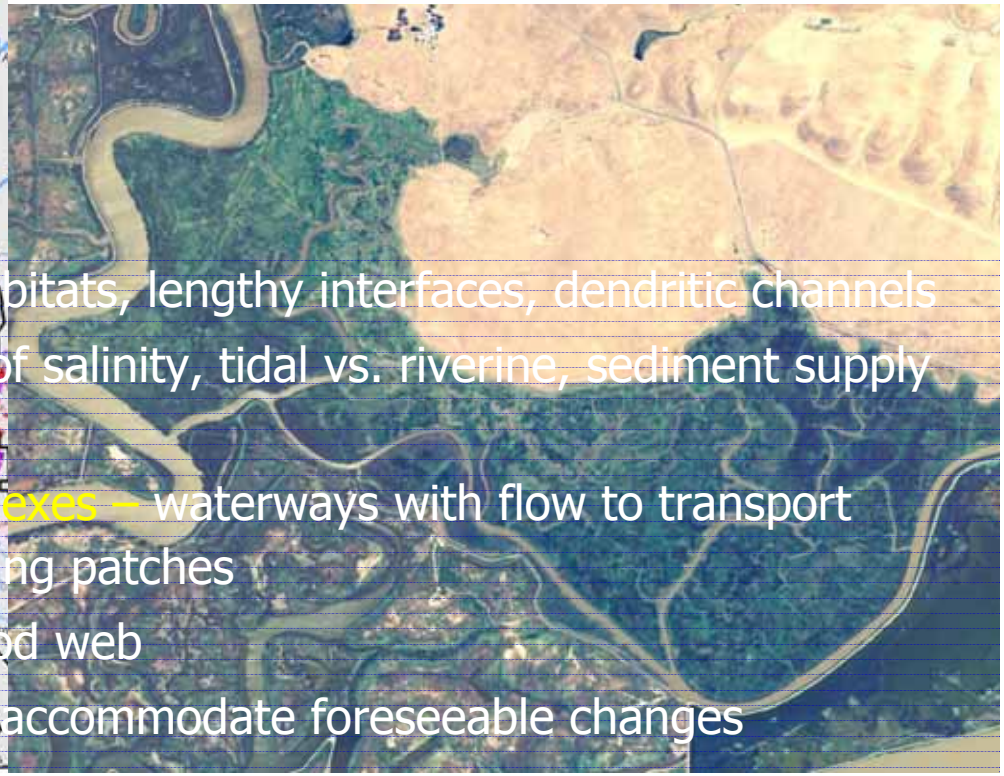
Example 3: Habitats and Processes – *Extent*

3. Grasslands/seasonal wetlands/sea level rise
   a) *Suitable area:* about ~130K ac Delta, 5K ac Suisun (need to refine upper elevation target)
   b) *Early priority areas:* corridor between Suisun Marsh and Cache Slough, lower-elevation lands, lands at high risk of urbanization, adjacent to tidal marsh and floodplains
4. Open Water
   a) *Delta smelt fall habitat:* 35K ac with <10 mS/cm
   b) *Delta smelt spring and summer habitat:* temperature w/in spawning range
   c) *Longfin smelt habitats:* pending

Ecosystem Complex Attributes



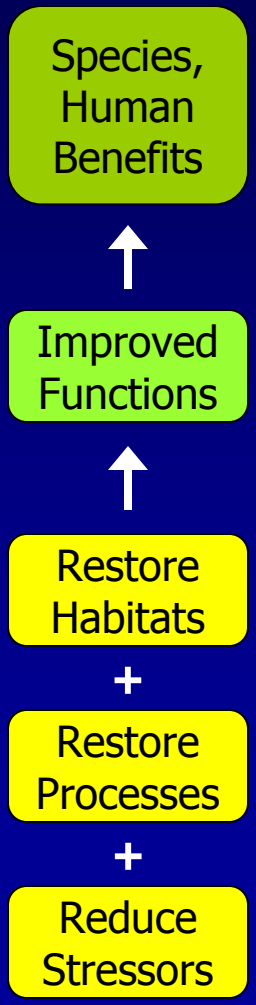




1. Restored in complexes – contiguous habitats, lengthy interfaces, dendritic channels
2. Spatially distributed – along gradients of salinity, tidal vs. riverine, sediment supply and away from diversion losses
3. Connectivity within and between complexes – waterways with flow to transport materials and organisms, corridors linking patches
4. Productivity – diatom-based aquatic food web
5. Durability/resilience – at locations that accommodate foreseeable changes

Strategies for Restoring Complexes

Next step for Eco Work Group; thus examples do not reflect full range needed to achieve targets



General Strategies

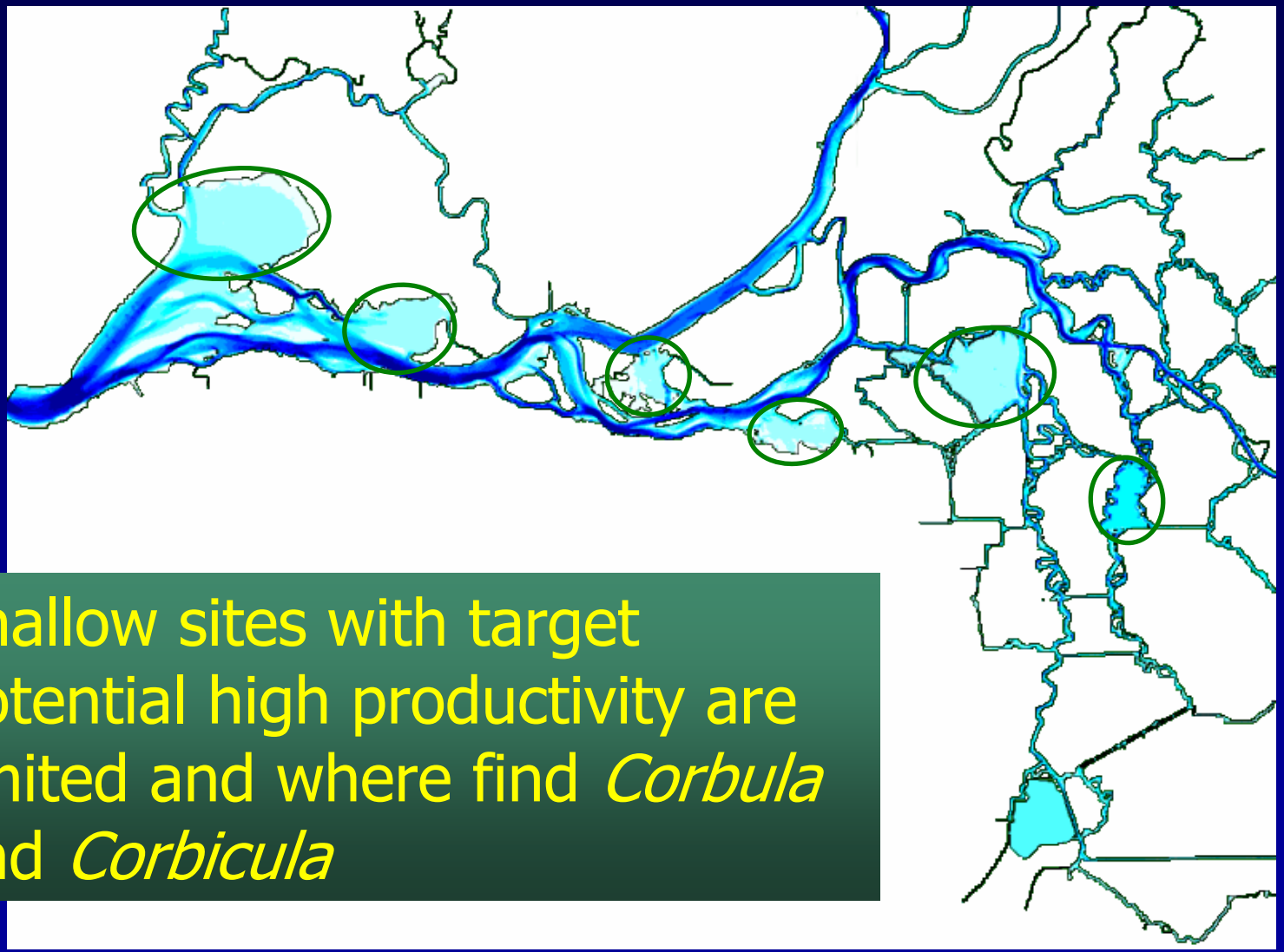
- Restore maximum tidal wetlands and inundate maximum floodplain possible, phased over time
- Preserve, enhance adjacent uplands and seasonal wetlands
- Control harmful invasive species
- Address flood protection needs, mosquitoes
- Minimize methyl mercury production

General Actions to Implement Strategies

- *Prioritize high recovery opportunity areas and at-risk lands*: e.g., Cache Slough, Dutch Slough, Suisun Marsh, Yolo Bypass, Suisun-Cache corridor, Cosumnes/Mokelumne, subsidence reversal/carbon sequestration
- Secure land rights, funding
- Resolve major export effects on net transport (e.g., Barker Slough, South Delta)
- Landform modifications

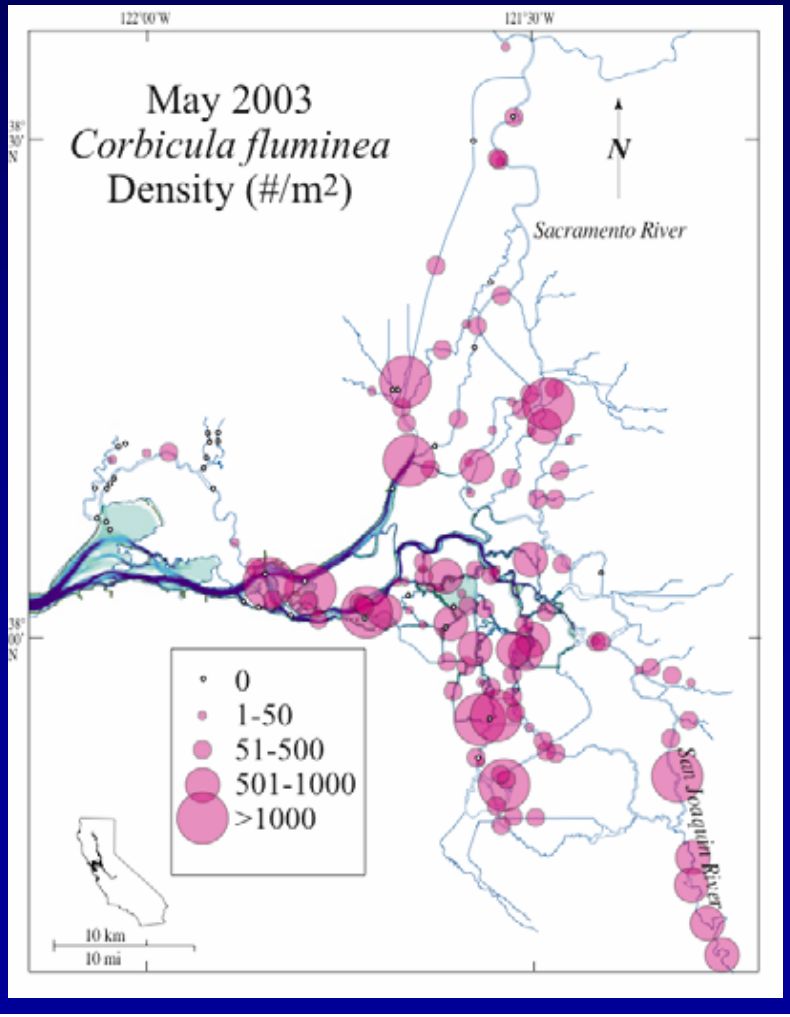
Example 4: Controlling the Clams

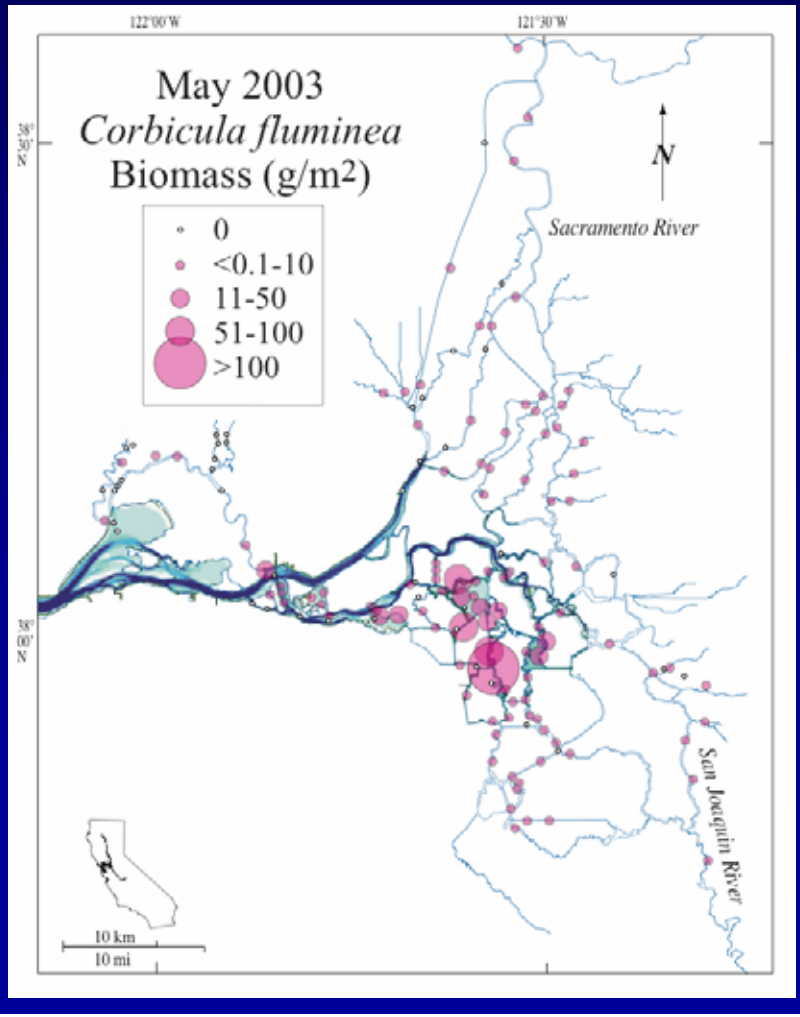
From Jan Thompson's presentation on Variable Delta



Shallow sites with target potential high productivity are limited and where find *Corbula* and *Corbicula*

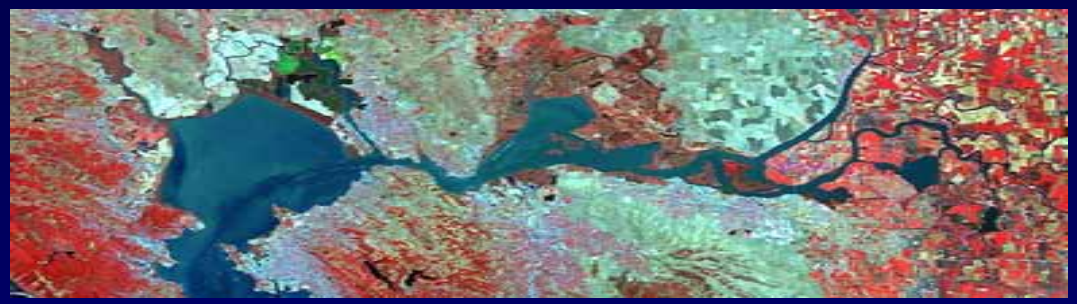
Corbicula are food limited so locations with large *Corbicula* biomass are few despite high recruitment. *Corbicula* can deposit feed and wait out the bad times. More food produced via restoration could fuel *Corbicula.* However, *Corbicula* co-existed with phytoplankton in the estuary since 1940's so if populations have not changed in some critical way, maybe we can go back in time?





Adult Salinity

Recruit Salinity



The salinity tolerance overlap with variable salinity translates to a spatially variable range for each species

Corbula habitat increases

Corbicula habitat shrinks